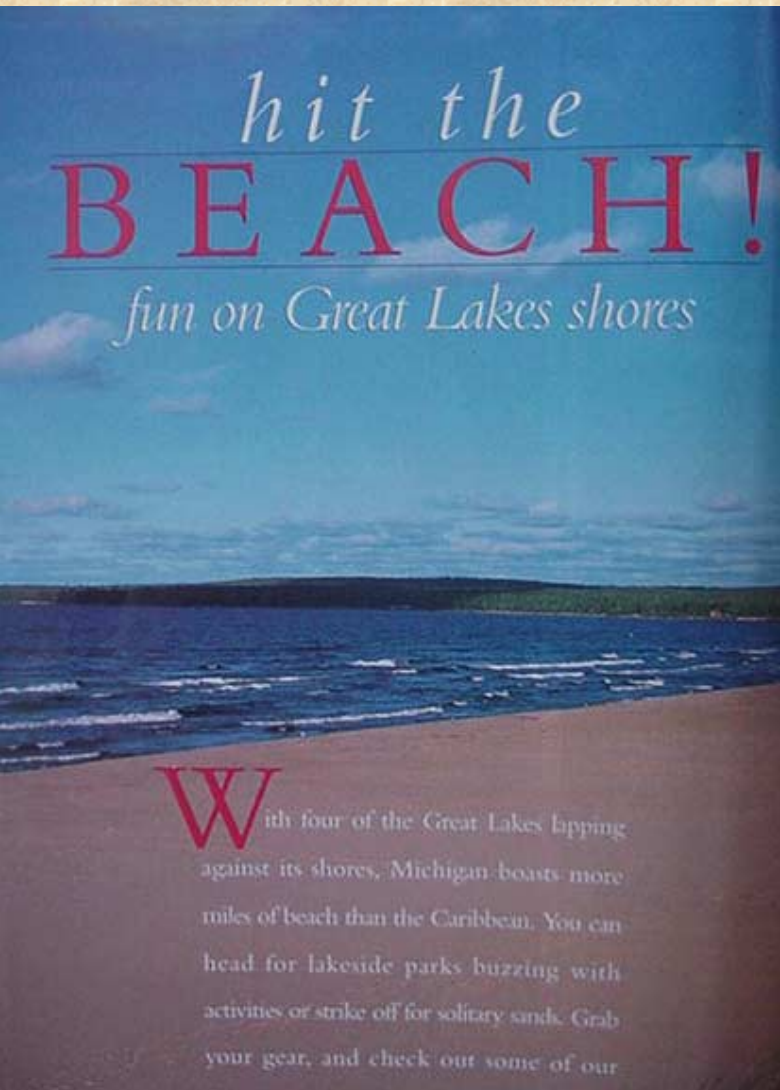


A sunset scene with a bright sun low on the horizon, casting a golden glow across the sky and reflecting on the water. A dark silhouette of a tree is visible on the right side of the frame.

GREAT LAKES BEACHES: PROTECT THE LEGACY

Beaches: Are they safe and available?



Over 770 Great Lakes Beaches

Sanitary Survey

- **Bacteriological** - fecal coliform or *E. coli* counts;
- **Biological** - nuisance aquatic plants, algal blooms, types of macroinvertebrates;
- **Chemical** - toxic substances, low dissolved oxygen, abnormal pH, odors;
- **Physical** - scum, floating solids, debris, oil, sludge, turbidity.

Marine Debris



Annual Coastal Clean-up



EPA United States
Environmental Protection Agency
Office of Water

Oceans and Coastal Protection Division

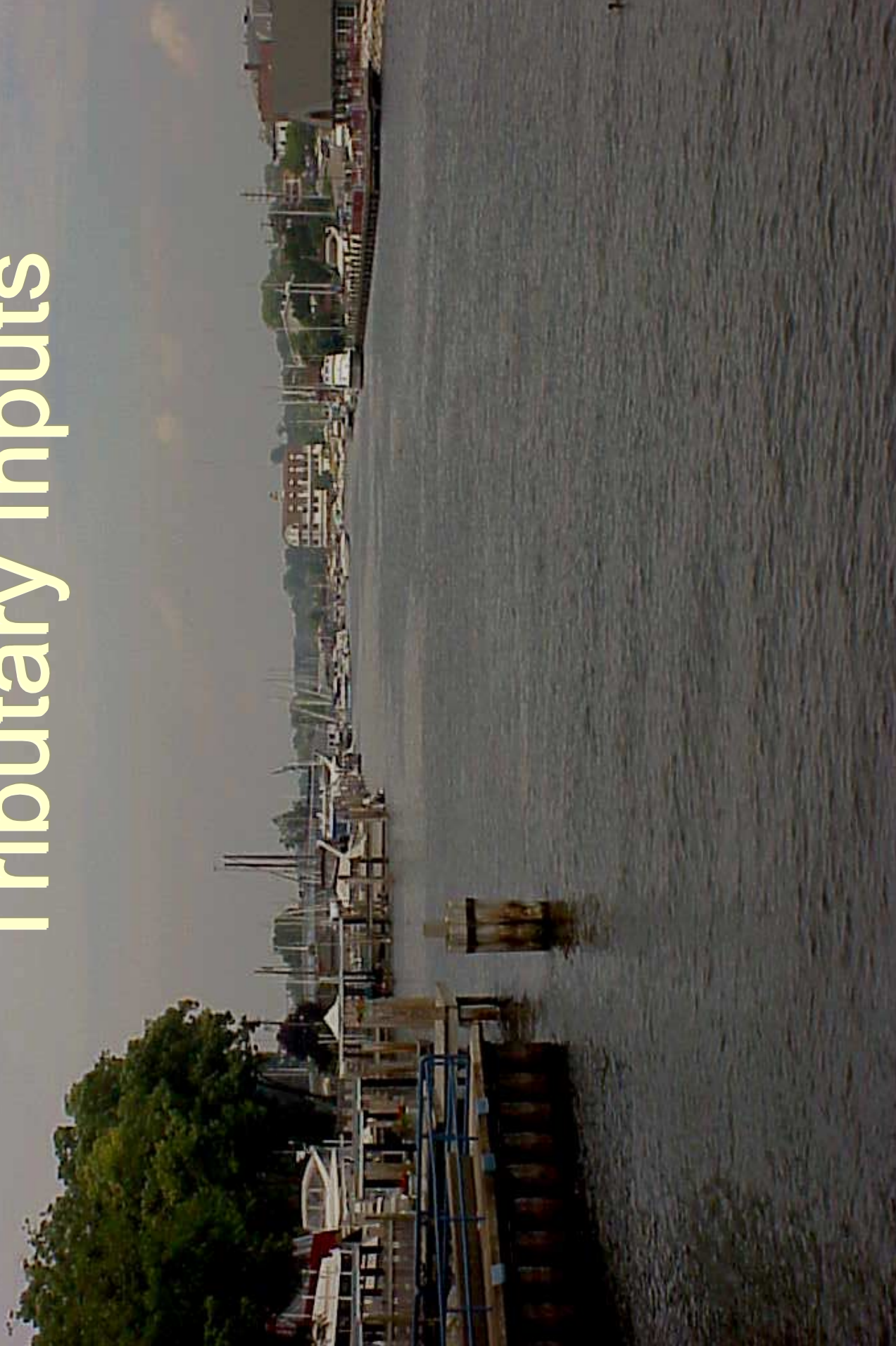
**Marine
Debris**



- Cigarette butts
- Balloons
- Ribbon
- Plastics
- Cans
- Broken glass
- Syringes

**Center for Marine Conservation
Lake Michigan Federation**

Tributary Inputs



Wildlife Impacts



Marinas, Boating, Shipping



Urban Impacts



Industrial Impacts



Fish Consumption Advisories



Shoreline Development



Microbial Contamination



Making Lake Michigan Great



Basin Wide *E. coli* Monitoring



Sponsored by U.S. EPA Region 5

May 2000

The Gazette SINCE 1778

MONTREAL

FIRST EDITION

FRIDAY, MAY 26, 2000 57¢

OUTSIDE METRO AREA 70¢

Cancer patients denied

E. coli death toll hits 5

THE TORONTO STAR



Recipe rescue
LIFE • FOOD

Teens and the Internet
BUSINESS

Lindros back in lineup
SPORTS



Scattered afternoon showers, breezy: High 22 C

Wednesday, May 24, 2000

www.thestar.com

ONTARIO EDITION

E-coli 'epidemic' hits almost 600

Schools closed near Owen Sound in outbreak called

almost 600 people sick. All schools and day-care centres in Windsor, a town of 20,000 people, outside of Owen Sound, have been shut down.

Local Hospitals: Some teens flooded with calls from almost 600 people, who say they are suffering symptoms ranging from fever, severe vomiting, bloody stool with a red start, feeling

weakly. London, Ont., because of critical symptoms. It was taken anywhere from two to 10 days before people in school with a red start, feeling

Johns, Inc. baby formula, etc. ■ Indemnity: Most drivers deny that policy is valid. ■ Blue: Drinking water for at least 3 months before consumption.

Federal health investigators have also been asked to help determine where's behind the outbreak in this community, at the Ontario Ministry of Health.

August 1, 2000

ILLW A U K E E JOURNAL SENTINEL

TUESDAY, AUGUST 1, 2000 — STATE EDITION — WWW.ONWISCONSIN.COM

MEN MAY HAVE
BIOLOGICAL
CLOCKS, TOO

8A



We don't want to get off on a rant here, but...

WAS DENNIS MILLER READY TO TALK FOOTBALL?

A review of the comic's 'Monday Night' debut

SPORTS

LOOKING TO
PARTY? BYO
COMPUTER

mjstech.com



REPUBLICAN CONVENTION

raises Bush's 'compassion'

sion," saying he "can help bridge our racial divides."

Laura Bush, the candidate's wife, said her husband was "running for president to make sure every child in America has that same opportunity to grow up reading."

Short on drama, and so devoid of spite that one observer dubbed the four-day event the "Nice Camped," the convention unfolded under the innocuous slogan of "Renewing America's Purpose. Together."

Monday night's theme: "Opportunity with a Purpose: Leave

Taking center stage were Powell, the former chairman of the Joint Chiefs of Staff, and Laura Bush, the native of Midland, Texas, who married 22 years ago into what, now, is America's leading political dynasty.

In his prepared remarks, Powell said that "in pursuing educational reform, as well as in all other parts of his agenda for Texas, Governor Bush has reached out to all Texans — white, black, Latino, Asian, Native American."

He added, "He has been successful in bringing more and more

INSIDE

- **Cheney:** Bush aide defends handling of critics / 10A
- **Protests:** Police allow march near convention / 11A
- **Hollywood:** GOP raising hackney / 8B
- **Cupcake:** Network's focus offers last tidbits

E. coli traced to watermelon

Sizzler apparently had tainted fruit

By Tom Hertz
of the Journal Sentinel staff

CHRONOLOGY
JULY 24

August 2, 2000

BACK IN TOWN

CART teams begin testing in preparation for the Motorola 920 Aug. 17-20/31



FIRE CHIEF'S JOB

Among the eight hopefuls are two from Sheboygan's Fire Department/A3



CLEVER CREATIONS

There's plenty of personality in these high-tech kitchens/C1

The Sheboygan Press

shebpress.com

Sections, 28 Pages

Wednesday, August 2, 2000

50 Cents

PRESS POLL

You make the call!

RESULTS

Q: Do you plan to follow the Republican and Democratic conventions?

27% yes; 73% no
Number of calls: 131

'Safe' swimming gets beached

Northside Beach signs warn of risk, but people still take to the water on Tuesday

By Andrew Weiland
of The Press Staff

Despite the presence of a pair of signs indicating the water at Northside Beach was "Unsafe For Swimming," several people were frolicking in the water there Tuesday.

The city closed the beach on Monday because testing of a water sample from the beach Friday indicated a higher than acceptable level of fecal coliform bacteria.

However, testing of a sample taken Monday at the beach indicated the water was safe. Therefore those swimming in the water Tuesday were probably not at risk, city officials say. The beach is expected to be reopened today.

The state says water with over 200 colonies of fecal coliform bacteria per 100 milliliters is unsafe to swim in. The Friday sample from Northside Beach had over 200 colonies (per 100 milliliters), but Monday's sample had 130.

At first glance on Tuesday, a warm sunny day, the beach did not appear closed. At 2 p.m., for example, about 25 people were playing in the water. Those swimming were apparently either unaware of concerns about the water quality, or chose to ignore them.

Mayor Janis Schramm and City Parks

Turn to BEACHED/A6



Two signs like this were posted at Northside Beach Tuesday to warn swimmers about the risk of swimming there.

On National Night Out, Plymouth turns into

August 3, 2000

60¢

FINAL EDITION

THURSDAY

STRICTLY KIDS' STUFF

Pop duo
Scruffy Garden
plays Inonia fair

FLAIR C1



GROWING THERAPY

Gardening proves
helpful for
recovering addicts

THE REGION B1



NO RUSH

Investors slow
to buy into
Spartan Stores
BUSINESS B5

The Grand Rapids Press

© THE FRIDAY, AUGUST 3, 2000

82 PAGES

Group urges more beach testing

► The report says only 12 of 41 Michigan counties with Great Lakes shoreline monitor the water for contaminants.

By John Tashiro
The Grand Rapids Press

An environmental group is calling on several West Michigan counties, including Allegan and Montcalm, to start testing at Lake Michigan beaches for water-borne contaminants that can harm swimmers with nausea, vomiting, stomach ache and diarrhea.

In a report released today, the Lake Michigan Federation says only a few

Michigan counties along the shoreline are testing for potentially harmful bacteria at public beaches. That list includes Ottawa County, where the county health department performs weekly summer testing at beaches for E. coli bacteria.

"No one wants to go to the beach and come home sick," said Tanya Chabla of the Lake Michigan Federation in Muskegon.

The reports from two environmental groups come as Michigan prepares to increase the monitoring of beaches for unhealthy levels of pollution from sewers, storm drains, livestock and wildlife. But local and even state officials say that effort falls far short of what is needed.

Last year, only 12 of the 41 Michigan counties that border the Great Lakes monitored most of their beaches weekly, according to the National Resources De-

partment (NRC) report.

They include Alpena, Astoria, Bay, Berrien, Charlevoix, Emmet, Macomb, Muskegon, Ottawa, St. Clair, Wayne and a limited program in Mackinac.

Lake must states, Michigan lacks a state law requiring beach monitoring, leaving that decision to counties. Although many counties do not take weekly samples, they will sample when learning of sewer overflows or other problems.

Counties are interested in regular monitoring but lack the funds to do it, said Mary Kuehlin, president of the Michigan Association of Local Public Health Agencies.

"This is a terrific state and we have the Great Lakes and a lot of beaches out there to be monitored, but we don't have adequate resources allocated to that," she said.

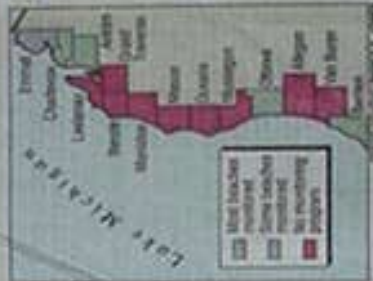
Some help is on the way. Just this week, the state Department of Emergency Management Quality began accepting applications for \$100,000 in grants to help local agencies and non-profit organizations monitor beaches.

The money is part of the Great Michigan Initiative fund program voters approved in 1998. Grants will be awarded in the fall.

"We're about \$500,000 shy," said Shanon Briggs, the DEMA program coordinator. "But this is seed money to get them started. It is to ensure that some counties get started and assist other counties in expanding their programs."

All of the laboratory requests in Illinois and Indiana have testing programs while six of 10 Wisconsin counties have programs for at least some beaches.

"If you look at the other states, (Michi-



(pic) is certainly not where they are," Chabla said. "It was surprising we had that

see B1A/C1A1

ELECTION 2000

August 4, 2000

NEWS

Chicago Sun-Time's

Group wants end to lake dumping

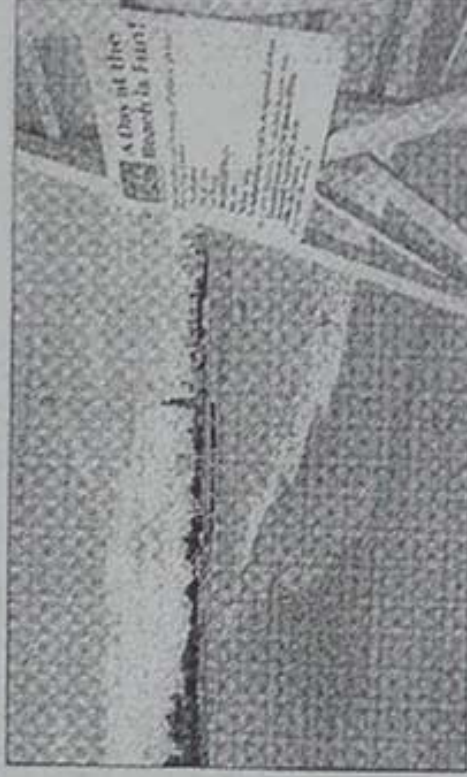
Wastewater permit to expire

BY GARY WESBY
ENVIRONMENT REPORTER

One reason for beach closings is the dumping of untreated wastewater into Lake Michigan when sewer systems are overloaded.

And with Chicago area beaches shutting down every few days—although fewer than last summer—the Lake Michigan Federation urged Thursday that the Metropolitan Water Reclamation District be forced to phase out the dumping practice.

The district's discharge permit expires this year. The federation



Don Black/Sun Times

The occasional release of untreated wastewater into Lake Michigan causes beach closings. A group wants to see the practice phased out.

The district's permit allows it to

The Milwaukee leader wants local

August 20, 2000

THE GRAND RAPIDS PRESS • SUNDAY, AUGUST 20, 2000

MICHIGAN

THE GRAND RAPIDS PRESS



PETER LUKE

Democrats d Gore fir voters

President Clinton helps his
rally the troops in
Nov. Gore needs to
to roll.

With pre-election polls showing Clinton leading, Democrats should be wailing off their brows — just as Al Gore did last week in Los Angeles. Clinton's lead is not a surprise. Clinton's lead is not a surprise. Clinton's lead is not a surprise.

TAINTED WATERS

Many streams,
lakes untested
for sewage
despite threats

By David Paulson
Grand Rapids Press News Service

It has been nearly a year since Marcus Bacha cut his leg while playing in a Shawansee County creek, exposing it to a bacteria that caused a life-threatening infection. But his mother's rage at state and local governments, which she says failed to protect her 8-year-old son from the hazards of raw sewage in a public waterway, has only intensified.

"I don't know whose leg to shake to get people in our government to take responsibility before it gets worse," said Kelly Bacha, of Durand, who nursed her son through two surgeries and months of physical therapy following the incident.

"I would ask that this state



Swing voter, voter

► Niles residents are listening to pitches from both presidential candidates. So far, none of them have really hit home.

EDITORS NOTE: Michigan's election is up for grabs. This year's presidential election is a crucial one for the state. To judge Terms Gov. George Bush's and Vice President Gore's chances in the state, Associated Press is talking to residents in their swing areas. We'll tell you how the election has turned out. This is the last story in our occasional series.

By James Prechard
The Associated Press

November 30, 2000



Buffalo News

- **Outbreak of type E botulism along the shore of Lake Erie kills fish-eating birds**

Human Health & Safety

- **Hazard Identification**
 - agent, characteristics, harmful effects
- **Risk Assessment**
 - dose/response
- **Exposure Assessment**
 - route, frequency, duration
- **Risk Characterization**



Water-associated Illnesses



Grouped by

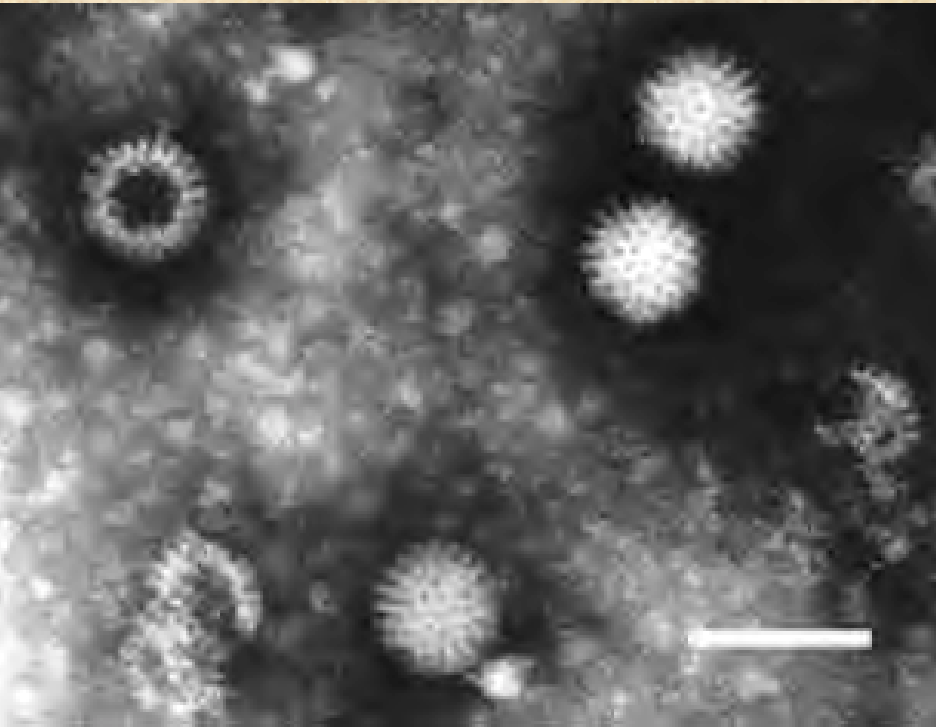
- **eye**
- **ear**
- **nose & throat**
- **gastrointestinal**
- **skin irritation**

Degree of Infection



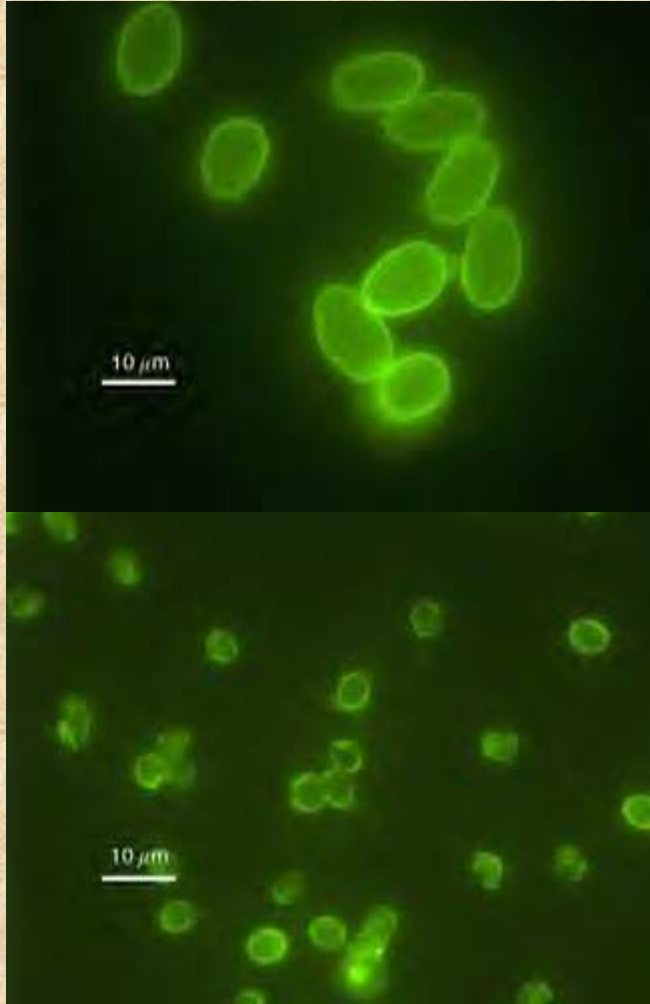
- **number of infectious organisms**
- **their virulence**
- **immune status of the potential host**

Viruses



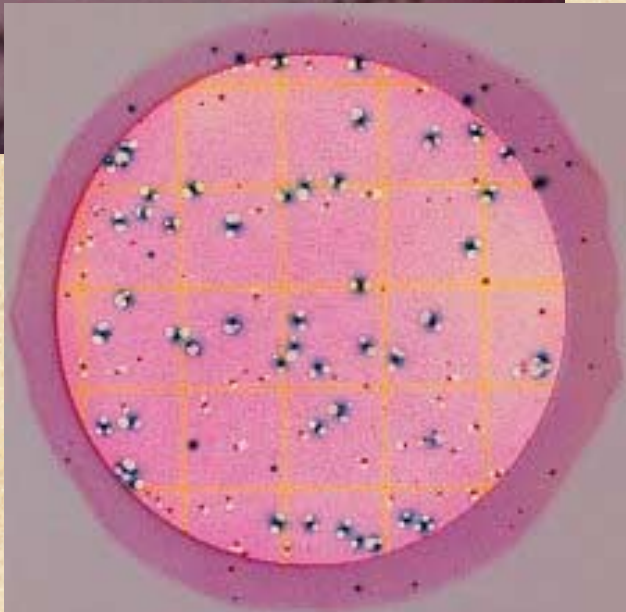
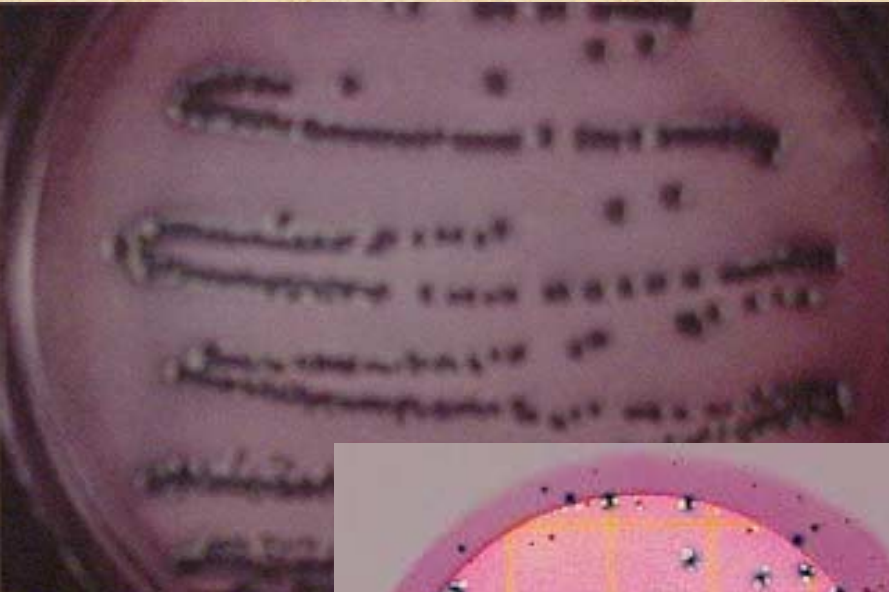
- Rotavirus
- Norwalk virus
- Polio virus
- Coxsackievirus
- Echovirus
- Adenovirus
- Hepatitis

Protozoa



- *Cryptosporidium*
- *Giardia lamblia*
- *Entamoeba histolytica*
- *Isospora* sp.
- *Balantidium coli*
- *Toxoplasma*

Bacteria



- *Escherichia coli*
- *Salmonella typhi*
- *Legionella*
- *Shigella dysenteriae*
- *Vibrio cholera*
- *Leptospira*
- *Aeromonas*

Parasitic Worms

- *Schistosoma*
“swimmers itch”
- Flatworms
- Nematodes

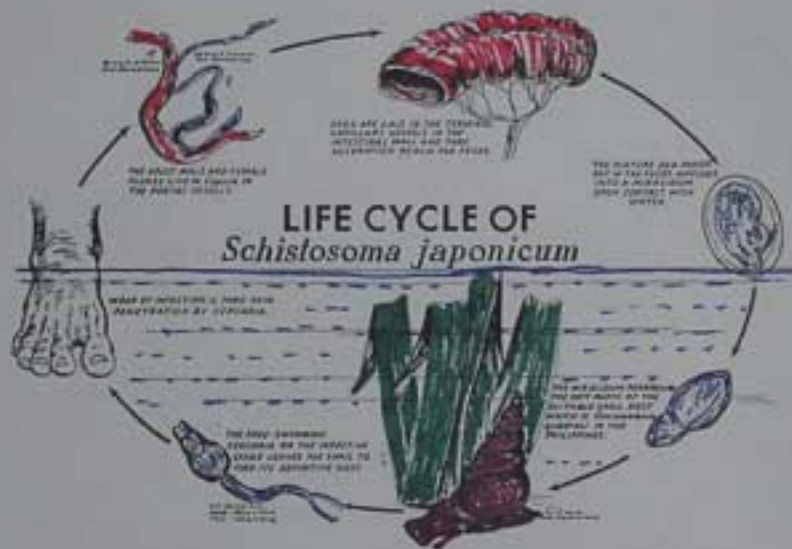


Fig. 8-6. Life cycle of *Schistosoma japonicum*. (Peterson, courtesy of Santa Thomas J. Med.)

Phytoplankton - Algae

Harmful Algal Blooms (HABs)



- *Microcystis*
- *Cyclospora*
- *Pfiesteria piscicida* (Oceans)
- *Gymnodinium brevii* (Oceans)

Standard Development



1. Does swimming in the water carry with it an increased risk of illness, and if so, to what type?

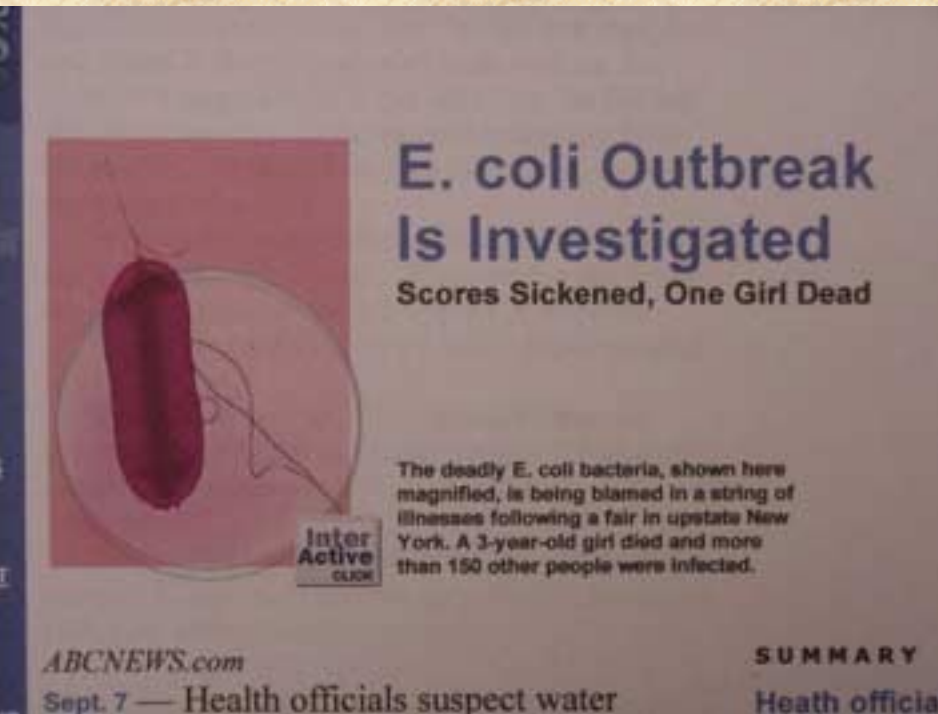
Standard Development

2. Is there an association of the illness rate to pollution from domestic wastewater, and if so, to what type of illness?



Standard Development

3. Which, if any, of the potential indicators of water quality best defines the illness symptomology to water quality?



Standard Development

4. Can the relationship of swimming-associated health effects to the quality of the water, as determined by a microbial or chemical indicator, be quantified sufficiently to produce a health effects, quality criterion for recreational waters?

Cabelli et al., 1983

Variation Among States/Provinces



- *E. coli* only
- Fecal coliform only
- Both
- Other

Freshwater Standards



E. coli

200 CFU per 100 mL;

E. coli

100 CFU per 100 mL
(Ontario)



Environment
Canada

Guidelines for Canadian Recreational Water Quality-1992

Freshwater Standards



E. coli

126 CFU per 100 mL;

or

Enterococci

33 CFU per 100 mL



U.S. EPA Ambient Water Quality for Bacteria - 1986

Significance of Standard



Water just meeting the above standard could cause an estimated eight illnesses per 1,000 swimmers.

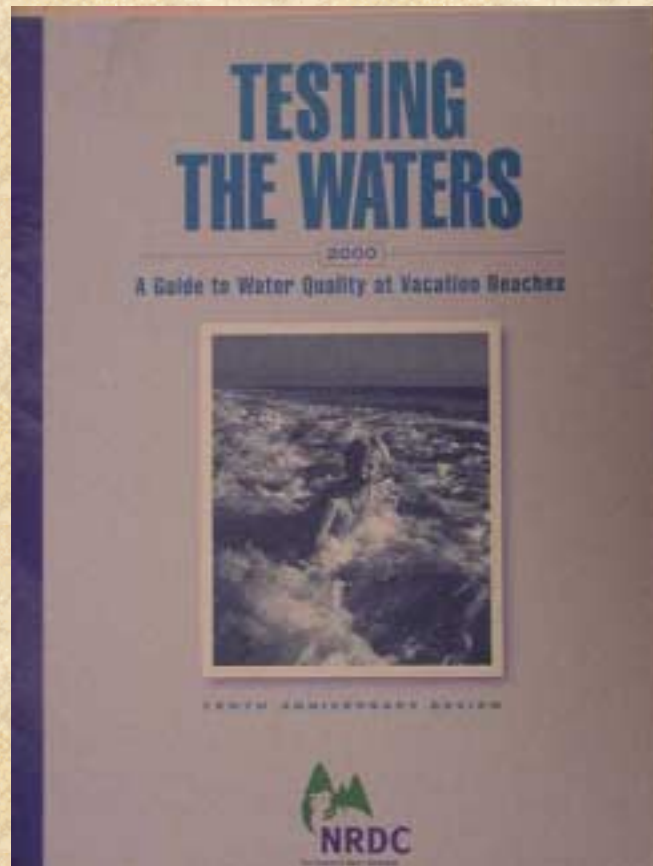
NRDC, 1997

When to Close a Beach



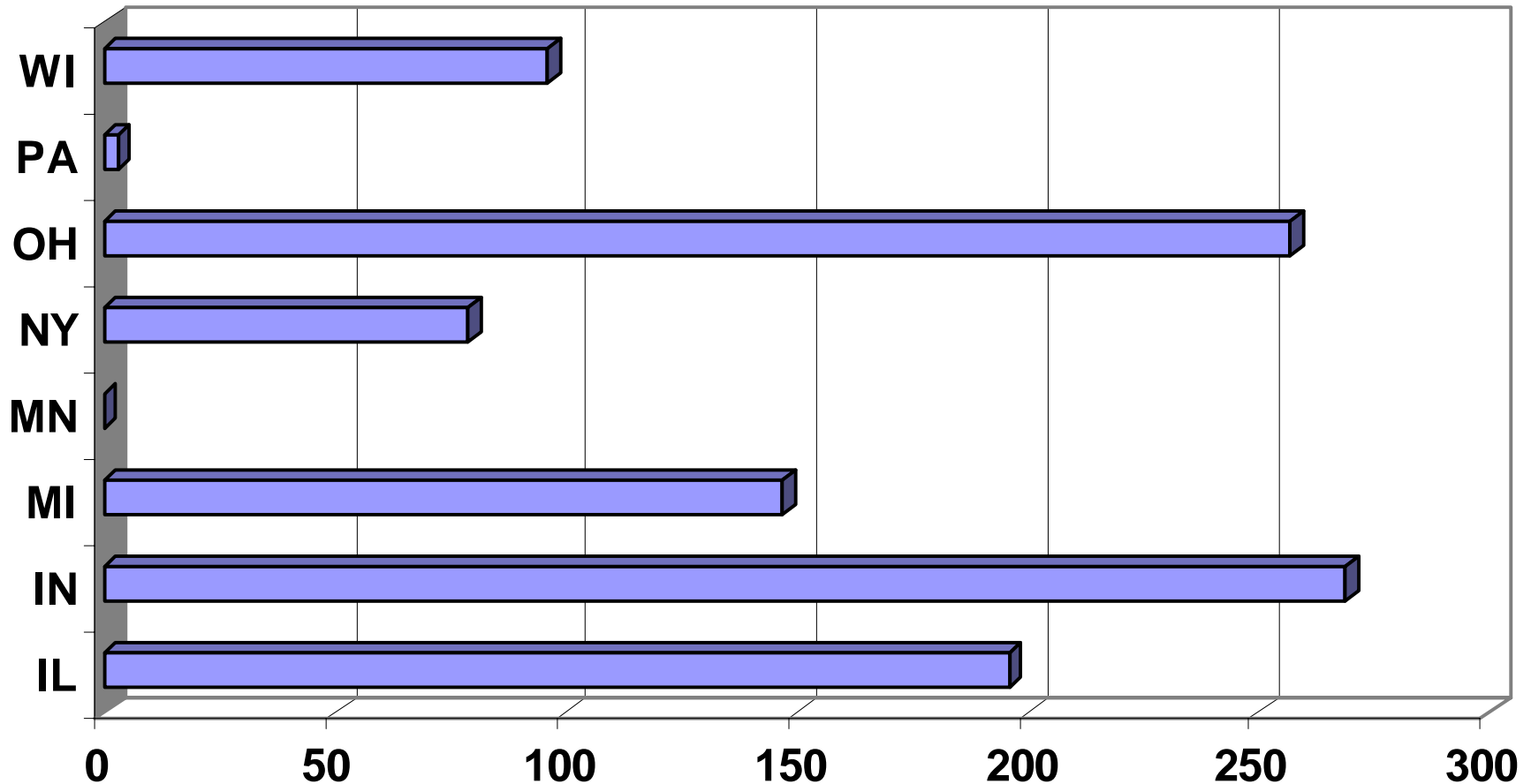
- Sampling
- Predictive models
- Real time information
- Risk communication

1999 Beach Closings/Advisories



- **Elevated bacteria levels**
- **Storm water and runoff**
- **Other (algal blooms, wildlife)**
- **Sewage**
- **Rain or preemptive**

1999 Beach Closings/Advisories



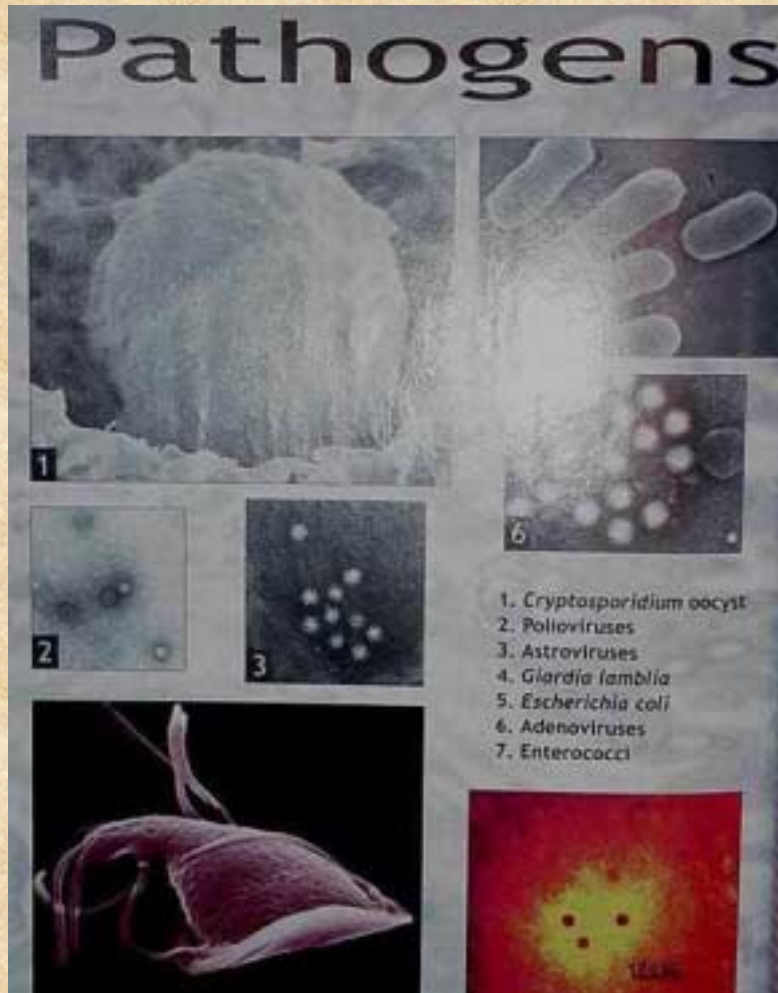
1999 Beach Closings/Advisories

	<u>IL</u>	<u>IN</u>	<u>MI</u>	<u>MN</u>	<u>NY</u>	<u>OH</u>	<u>PA</u>	<u>WI</u>
Bacteria	105	215	131	0	NA	257	3	11
Wildlife	0	74	0	0	NA	0	0	0
Rain	85	0	131	0	NA	206	0	85
Sewage	14	11	89	0	NA	0	0	3

Challenges for the Future



Alternative Indicators



- Association with illness
- Ease of detection
- Short time frame for results
- Reliability

Source Characterization



- **Differentiation of human vs. animal fecal contamination**
 - DNA fingerprinting
 - phage typing
 - PCR probes

E. coli and Beach Sand



- Where?
- Extent?
- Sand or surf?
- Persistence?
- Public health significance?



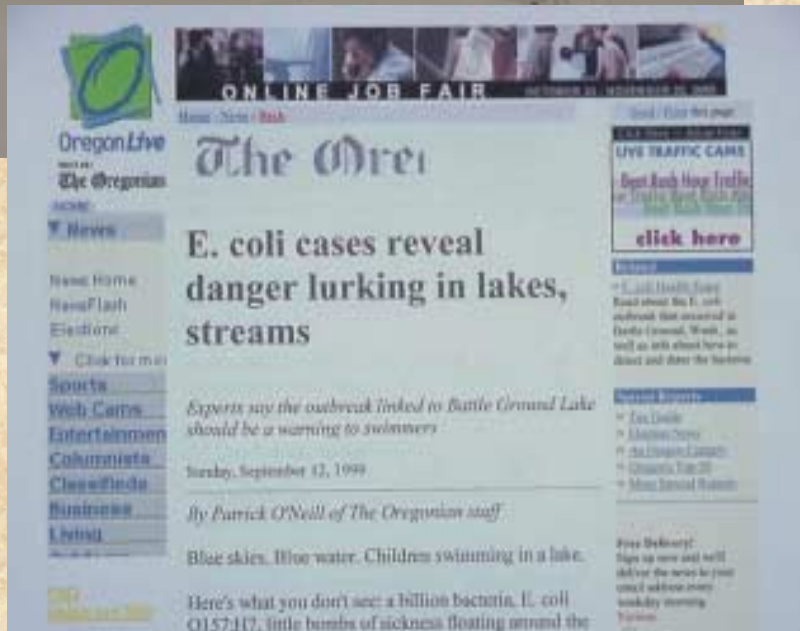
Balancing Cost-Benefit



- Cost of monitoring
- Lost beach days

VS.

- Illness/hospitalization
- Lost work days



Beach Specific Standards



- Actual risk vs. perceived risk
- Sources of contamination
- Full vs. partial body contact
- Dry vs. wet weather conditions

Microbial Management



Perspective

A single high *E. coli* [or fecal coliform] number does not necessarily mean anything as the *E. coli* could be from excrement left by a deer or another animal a short time before the sample was collected. However, a series of elevated samples is a reason for concern.

Alabama Water Watch, 1996

Perspective

It is impossible to design a regulatory program that can guarantee that any reasonable standard *never* will be violated, and there is a growing awareness that probabilistic concepts should be an integral part of the standard setting process.

Ward and Loftis, 1983